EASY GRIP PAINT APPLICATOR

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ABSTRACT
The present invention comprises an applicator for coatings such as paints, stains, varnish, and other such materials. The applicator may be a brush, foam, or other applicator as conventionally used for such materials. According to the present invention, the handle of the applicator is adapted to be received in the hand of a user when the hand is in a substantially relaxed posture, and supports the hand in the posture. The handle of an applicator made according to the present invention also may include visual or other aids to promote the use of a relaxed hand posture to hold the applicator.
FIG. 11A

FIG. 11B

FIG. 11C

FIG. 11D

FIG. 11E
EASY GRIP PAINT APPLICATOR

CROSS REFERENCE TO RELATED APPLICATIONS


FIELD OF THE INVENTION

[0002] The present invention relates to ergonomically designed and useful applicators for applying coatings such as paint, varnish, stain and the like to walls or other surfaces. These applicators are configured to be held and manipulated more easily by a user when applying paint or other coatings, thereby reducing or delaying the fatigue of the user.

BACKGROUND OF THE INVENTION

[0003] Conventional brushes used for applying paint or other coatings have essentially remained unchanged for many years. FIG. 1 illustrates such a conventional brush 510, which generally includes a wooden or rigid plastic handle 512, ferrule 514 and brush bristles 516. Handle 512 generally includes body 520, neck 522, and head 524.

[0004] The ferrule 514 retains the bristles and joins them to the handle. Ferrule 514 typically comprises a metal plate or band nailed, stapled or riveted to and about head 524 of handle 512 and partially about brush bristles 516. Ferrule 514 receives the axial ends of bristles 516, and conceals glue or other adhesive to hold the bristles in place.

[0005] Although brushes such as those illustrated have been standard in the field, they have numerous drawbacks that have been left unattended. Such brushes require the user to alter her hand from a relaxed state (or “posture”) to a strained or flexed posture. (A relaxed hand posture is the typical posture of the hand when a person stands with her arms at her sides and at rest. Even when work is being performed, when in a relaxed posture, the person’s hands resist fatigue.)

[0006] Because tradesmen and do-it-yourselfers working with such brushes often use these brushes for extended periods and over many days, the risks of fatigue are substantial. As a result, there is a continuing need for a paint brush that reduces or delays the onset of such fatigue.

[0007] Prior attempts to solve this problem have met with limited success. For example, the Supreme™ brush sold by EZ Paintr included a handle featuring an indentation for aiding the user in locating her thumb at a place on the handle in a manner that was more like a relaxed hand posture. While representing an improvement over conventional brushes, this product still caused the hand to be in flexed, and therefore fatigue-prone, posture.

SUMMARY OF THE INVENTION

[0008] The present invention comprises an applicator for coatings such as paints, stains, varnish, and other such materials. The applicator may be a brush, foam, or other applicator as conventionally used for such materials. According to the present invention, the handle of the applicator is adapted to be received in the hand of a user when the hand is in a substantially relaxed posture, and supports the hand in the posture. The handle of an applicator made according to the present invention also may include visual or other aids to promote the use of a relaxed hand posture to hold the applicator.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. 1 is a perspective view of a paint brush of the prior art.

[0010] FIG. 2 is a perspective view of a first embodiment of a paint brush of the present invention illustrating the brush being grasped in phantom.

[0011] FIG. 3 is an enlarged fragmentary side elevational view of the brush of FIG. 2.

[0012] FIG. 4 is an enlarged fragmentary top elevational view of the brush of FIG. 2.

[0013] FIG. 5A is a perspective view of a second embodiment of the brush of FIG. 2.

[0014] FIG. 5B is a top elevational view of the brush of FIG. 5A, the bottom elevational view being a mirror image thereof.

[0015] FIG. 5C is a rear elevational view of the brush of FIG. 5A, the front elevational view being a mirror image thereof.

[0016] FIG. 5D is a right end elevational view of the brush of FIG. 5A.

[0017] FIG. 5E is a left end elevational view of the brush of FIG. 5A.

[0018] FIG. 6 is a perspective view of a third embodiment of the brush of FIG. 2.

[0019] FIG. 7 is a fragmentary sectional view of the brush of FIG. 6 taken along line 7-7.

[0020] FIG. 8 is a perspective view of a fourth embodiment of the brush of FIG. 2.

[0021] FIG. 9 is a perspective view of a fifth embodiment of the brush of FIG. 2.

[0022] FIG. 10 is an enlarged fragmentary sectional view of the brush of FIG. 9 taken along line 10-10.

[0023] FIG. 11A is a perspective view of a sixth embodiment of the brush of FIG. 2.

[0024] FIG. 11B is a top elevational view of the brush of FIG. 11A, the bottom elevational view being a mirror image thereof.

[0025] FIG. 11C is a rear elevational view of the brush of FIG. 11A, the front elevational view being a mirror image thereof.

[0026] FIG. 11D is a right end elevational view of the brush of FIG. 11A.

[0027] FIG. 11E is a left end elevational view of the brush of FIG. 11A.

[0028] FIG. 12A is a perspective view of a seventh alternative embodiment of the brush of FIG. 2.
FIG. 12B is a top elevational view of the brush of FIG. 12A, the bottom elevational view being a mirror image thereof.

FIG. 12C is a rear elevational view of the brush of FIG. 12A, the front elevational view being a mirror image thereof.

FIG. 12D is a right end elevational view of the brush of FIG. 12A.

FIG. 12E is a left end elevational view of the brush of FIG. 12A.

FIG. 13A is a perspective view of an eighth embodiment of the brush of FIG. 2.

FIG. 13B is a rear elevational view of the brush of FIG. 13A, the front elevational view being a mirror image thereof.

FIG. 13C is a top elevational view of the brush of FIG. 13A.

FIG. 13D is a bottom elevational view of the brush of FIG. 13A.

FIG. 13E is a left end elevational view of the brush of FIG. 13A.

FIG. 13F is a right end elevational view of the brush of FIG. 13A.

FIG. 14 is a perspective view of the brush of FIG. 13A illustrating the brush being grasped in phantom.

FIG. 15 is a sectional view of the brush of FIG. 14 taken along line 15-15.

FIG. 16 is a sectional view of the brush of FIG. 14 taken along line 15-15.

FIG. 16A is a perspective view of a ninth embodiment of the paint brush of FIG. 2.

FIG. 16B is a rear elevational view of the brush of FIG. 16A, the front elevational view being a mirror image thereof.

FIG. 16C is a top elevational view of the brush of FIG. 16A.

FIG. 16D is a bottom elevational view of the brush of FIG. 16A.

FIG. 16E is a left end elevational view of the brush of FIG. 16A.

FIG. 16F is a right end elevational view of the brush of FIG. 16A.

FIG. 17A is a perspective view of a tenth embodiment of the paint brush of FIG. 2.

FIG. 17B is a rear elevational view of the brush of FIG. 17A, the front elevational view being a mirror image thereof.

FIG. 17C is a top elevational view of the brush of FIG. 17A.

FIG. 17D is a bottom elevational view of the brush of FIG. 17A.

FIG. 17E is a left end elevational view of the brush of FIG. 17A.

FIG. 17F is a right end elevational view of the brush of FIG. 17A.

FIG. 18A is a perspective view of an eleventh embodiment of the paint brush of FIG. 2.

FIG. 18B is a top elevational view of the brush of FIG. 18A, the bottom elevational view being a mirror image thereof.

FIG. 18C is a rear elevational view of the brush of FIG. 18A, the front elevational view being a mirror image thereof.

FIG. 18D is a right end elevational view of the brush of FIG. 18A.

FIG. 18E is a left end elevational view of the brush of FIG. 18A.

FIG. 18F is a rear elevational view of the brush of FIG. 18A, the front elevational view being a mirror image thereof.

FIG. 19A is a perspective view of a twelfth embodiment of the brush of FIG. 2.

FIG. 19B is a top elevational view of the brush of FIG. 19A, the bottom elevational view being a mirror image thereof.

FIG. 19C is a front elevational view of the brush of FIG. 19A.

FIG. 19D is a rear elevational view of the brush of FIG. 19A.

FIG. 19E is a left end elevational view of the brush of FIG. 19A.

FIG. 19F is a right end elevational view of the brush of FIG. 19A.

FIG. 20A is a perspective view of a thirteenth embodiment of the brush of FIG. 2.

FIG. 20B is a front elevational view of the brush of FIG. 20A, the rear elevational view being a mirror image thereof.

FIG. 20C is a top elevational view of the brush of FIG. 20A.

FIG. 20D is a bottom elevational view of the brush of FIG. 20A.

FIG. 20E is a left end elevational view of the brush of FIG. 20A.

FIG. 20F is a right end elevational view of the brush of FIG. 20A.

FIG. 21 is a perspective view of a fourteenth embodiment of the brush of FIG. 2.

FIG. 22A is a perspective view of a fifteenth embodiment of the brush of FIG. 2.

FIG. 22B is a front elevational view of the brush of FIG. 22A, the rear elevational view being a mirror image thereof.

FIG. 22C is a top elevational view of the brush of FIG. 22A, the bottom elevational view being a mirror image thereof.

FIG. 22D is a left end elevational view of the brush of FIG. 22A.
FIG. 22E is a right end elevational view of the brush of FIG. 22A.

FIG. 23 is a fragmentary exploded view of a paint brush illustrating one possible method by which the paint brush of FIG. 2 and the alternative embodiments of the paint brush of FIG. 2 may be manufactured.

FIG. 24 is a sectional view of the paint brush of FIG. 23 taken along line 24-24.

FIG. 25 is a sectional view of the brush of FIG. 23 taken along line 24-24 illustrating the brush assembled.

FIG. 26 is a fragmentary sectional view of the brush of FIG. 24 taken along line 26-26.

FIGS. 27 and 28 are fragmentary sectional views illustrating a method for forming a paint brush such as the paint brush of FIG. 2 and alternative embodiments of the paint brush of FIG. 2 may be formed.

FIG. 29 is an exploded perspective view of a paint brush illustrating a method by which the paint brush of FIG. 2 or the alternative embodiments of the paint brush of FIG. 2 may be formed.

FIG. 30 is a sectional view of the paint brush of FIG. 29 assembled taken along line 30-30.

FIG. 31 is a sectional view of the paint brush of FIG. 29 assembled taken along line 31-31.

FIG. 32 is a fragmentary sectional view of a paint brush illustrating a method by which bristles may be secured to a handle of a paint brush.

FIG. 33 is a sectional view of the paint brush of FIG. 32 taken along line 33-33.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

FIGS. 2-4 illustrate one paint applicator (shown as paint brush 610) made according to the present invention. Paint brush 610 generally includes handle 612, internal ferrule 614 (shown in FIGS. 32-35) and brush bristles 616. Handle 612 generally includes shaft portion or body 620, neck 622 and head 624. Body 620, neck 622 and head 624 are preferably integrally formed as a single unitary body out of one or more materials which are molded or co-molded together with one another. In this embodiment, body 620, neck 622 and head 624 are formed from polypropylene. Alternatively, other materials such as polyethylene or nylon may be utilized. Body 620 comprises the elongate narrower portion of brush handle 512 extending from neck 622 away from head 624.

Neck 622 extends between body 612 and head 624. Neck 622 preferably has a narrower diameter as compared to body 612 and head 624. Alternatively, neck 622 may have a diameter substantially similar to the diameter of body 612, yet narrower than head 624.

Head 624 extends from neck 622 towards bristles 616 and generally includes faces or sides 628, 630, spines 632, 634, mouth 636 and throat 640 (shown in FIG. 32). Sides 628, 630 are substantially identical to one another and extend opposite one another between spines 632, 634 from neck 622 to mouth 636. Each of sides 628, 630 generally includes thumb slide 640 and mound or hump 642. Thumb slide 640 comprises a concavity or depression formed in each of sides 628, 630. As indicated by the contour lines, thumb slide 640 is generally arcuate in shape along its front most boundary towards bristles 616 and substantially extends from spine 632 to spine 634. Thumb slide 640 is preferably positioned so as to receive the tip of the painter’s thumb when brush 612 is being held as indicated in phantom. Thumb slide 640 is preferably axially spaced from neck 622 by a distance slightly less than the distance between the painter’s “sniff box” between the painter’s thumb and index finger and the tip of the painter’s thumb. In this embodiment, the forward-most portion of thumb slide 640 is axially spaced from neck 622 by a distance of approximately 1.5 inches. The forward-most portion of thumb slide 640 (i.e., the surface of thumb slide 640 most closely adjacent to bristles 616) is spaced from mouth 636 and the exposed portions of bristles 616 by a distance no greater than 2.25 inches.

Hump 642 comprises a portion of head 624 with increased thickness between sides 628, 630. Hump 642 generally extends from spine 632 to spine 634 between thumb slide 640 and mouth 636. Hump 642 preferably has a maximum thickness or height intermediate to thumb slide 640 and mouth 636 such that hump 642 has a rounded ridge 644 (shown in FIG. 17) while tapering on both sides of ridge 644. Ridge 644 is preferably situated so as to extend below the distal most joint 645 of a painter’s fingers 647. Hump 642 preferably has an increased thickness along ridge 644 such that the painter’s fingers 647, when positioned against either side 628 or 630 are slightly bent at the finger joints in an arcuate orientation.

Spines 632, 634 are substantially identical to one another and extend opposite one another along the upper and lower edges of head 624 between neck 622 and mouth 636. Each spine 632, 634 generally includes support surface 648 and locator surface 650. Support surface 648 (also known as camel back 648) generally extends from neck 622 forwardly past thumb slide 640 to locator surface 650. Support surface 648 arcuately extends from neck 622 forwardly towards bristles 616 so as to provide a surface upon which the painter’s index finger may contact and rest upon while the tip of the painter’s index finger is positioned over and against locator surface 650. Support surface 648 preferably extends in a smooth arc between neck 622 and locator surface 650. In this embodiment, support surface 648 has an arcuate slope no greater than 45 degrees. In particular, the distance or the change in height dy over the corresponding change in length dx between any two points along support surface 648 has an absolute value less than 1, where the change in length is taken along centerline 619 of paint brush 610 and wherein the change in height is taken with respect to the centerline 619 in the direction indicated by arrow 621. At the same time, support surface 648 is preferably rounded so as to smoothly blend into sides 628 and 630.

Locator surface 650 comprises a depression or concavity extending along each of spines 632, 634 between sides 628, 630 and slightly forward thumb slide 640 and slightly rearward ridge 644 of hump 642. Locator surface 650 is located so as to overlap the axial ends of bristles 616 and to also at least partially overlap internal ferrule 614. Locator 650 is preferably spaced from mouth 636 by a distance no greater than 2.25 inches. The forward-most portion of locator surface 650 is preferably located no
greater than 0.75 inches from mouth 636 and no less than 0.125 inches from mouth 636. As a result, locator surface 650 provides the painter with greater control over brush 610. In alternative embodiments where the ferrule overlaps the end of the handle, locator surface 650 is preferably no greater than 2.25 inches from the end of the ferrule or the filaments. Locator surface 650 preferably has a depth sufficient to retain the tip of the painter’s index finger in place during painting. The concavity or depression forming locator 650 preferably has a front surface 654 (best shown in FIG. 3) extending between sides 628, 630 and forwardly inclined to serve as a stopping surface resisting the forward motion of painter’s index finger. The depression or concavity forming locator 650 also preferably includes a rearward incline surface 656 extending between sides 628, 630 that facilitates the painter applying a rearward force to brush head 624 with his or her index finger.

Mouth 636 extends along a forward most end of head 624 between the outer surfaces of head 624 and throat 638. In contrast, mouth 638 comprises an internal cavity extending from mouth 636 towards body 620 and between sides 628, 630. As will be described in greater detail hereafter with respect to FIGS. 23-25, throat 638 receives and retains internal ferrule 614 as well as the bristle ends secured within the internal ferrule 614. As will be appreciated, the size and depth of throat 638 will vary depending upon the size of head 624, the size of ferrule 614 and the volume and density of bristles extending therefrom.

Overall, brush 610 is adapted to promote a relaxed hand posture when being gripped. Brush 610 promotes a relaxed hand posture by various approaches. First, handle 612 of brush 610 is specifically configured to nest within the painter’s hand when being gripped. In other words, handle 612 is shaped and sized so as to minimize gaps or openings between interior surfaces of the user’s hand and fingers and the opposite surfaces of handle 612 such as body 620. In the particular embodiment illustrated, the shape and dimension of handle 612 and body 620 is based upon anatomical dimensions of a human hand when that hand is in a relaxed hand posture. For purposes of this disclosure, a “relaxed hand posture” is the natural posture or positioning of the user’s palm, fingers and thumb when the user’s arms are hanging along the user’s sides at rest and when the hand is in a relaxed state. Because paint brush 610 is specifically dimensioned and shaped based upon the anatomical dimensions of a human hand when in a relaxed state and because body 620 is specifically configured to nest within the user’s hand when being grasped, brush 610 is more comfortable and less fatiguing to grip and manipulate as compared to brush 510.

Second, handle 612 includes a plurality of grip locator cues which indicate proper gripping locations on handle 612 for achieving a relaxed hand posture. These cues include thumb slides 640 and locator surfaces 650. Such distinctively shaped surfaces indicate to an amateur painter how the person’s fingers and thumb should be positioned against handle 612. Such cues may be further enhanced by texturally distinctive surfaces and visually distinctive color arrangements.

As shown by FIG. 1, brush 510 has a relatively short head 524 to which is secured metal ferrule 514. Both head 524 and ferrule 514 include multiple flat surfaces bordered by relatively sharp and defined edges. In contrast, brush 610 has a much larger head 624 which provides a generally smooth and continuous outer surfaces against which the painter may position his or her hand, fingers and thumb. Because head 624 is larger and includes an internal cavity for receiving ferrule 614, the edges of ferrule 614 are not exposed. Thus, brush 610 is much more comfortable to grasp.

As further shown by FIG. 1, head 524 of brush 510 is relatively short and has spines 532, 534 that are steeply angled with respect to neck 522. As a result, when brush 510 is grasped by a painter as shown in phantom, relatively large gaps or spaces 525, for example, exist between the painter’s index finger and spines 532. Moreover, as compared to brush 610, head 524 or brush 510 is relatively thin, further spacing the outer surface of head 524 and ferrule 514 away from the painter’s fingers. As a result, due to the limited amount hand surface in contact with brush 510, the painter must apply greater pressure by squeezing harder to maintain a comfortable and secure grip of brush 510.

In contrast, head 624 is larger and thicker. In addition, spines 632, 634 extend in a relatively large arc to neck 622 to enable support surface 648 to remain in constant contact with substantially the entirety of the painter’s index finger. Consequently, head 624 fills the void or gap left by brush 510. Because this gap is filled, a greater surface area of the painter’s hand remains in contact with head 624 to thereby lessen the amount of pressure that the painter must apply with his or her hand to maintain a comfortable grip of brush 610. This is extremely important when the head of the brush becomes slippery due to sweat, moisture or paint.

As shown by FIG. 1, brush 510 fails to provide an amateur painter with any positive identification or suggestion as to where the painter should place his or her fingers and thumb or as to how the painter should preferably grip the brush. In contrast, sides 628, 630 include thumb slides 640 while spines 632, 634 include locators 650 to suggest an amateur painter how brush 610 should be gripped. More importantly, such surfaces provide positive stops to assist the painter in maintaining his or her thumb and fingers in the proper location even when slippery. Because thumb slides 640 substantially extend in an arc between spines 632, 634, thumb slides 640 allow for micro variations in position by the painter to further reduce fatigue. Thumb slides 640, locator 650 and hump 642 also provide stop surfaces to enable the painter to push forward by further curling one’s fingers in a counterclockwise direction as shown in FIG. 3.

FIGS. 5A-5E illustrate paint brush 710, an alternative embodiment of brush 610. Brush 710 is similar to brush 610, but has slightly more exaggerated contours to provide brush 710 with a unique aesthetic appearance. Brush 710 is but one example of a visually different paint brush incorporating the same basic advantageous features of brush 610. For brevity of discussion, those functional features of brush 610 which have been incorporated into brush 710 are numbered similarly but with additional prime designations.

FIGS. 6 and 7 illustrate brush 810, an alternative embodiment of brush 610. Brush 810 is similar to brush 610 except that brush 810 includes locators or side grips 840 in lieu of thumb slide 640 and includes locators 850 in lieu of locators 650. For brevity of discussion, those remaining surfaces of brush 810 which substantially correspond to
similar surfaces of brush 610 are numbered similarly with an added prime designation to reflect that the exact shape may have been modified slightly to vary its aesthetic appearance yet maintain its basic functional qualities. Side grips 840 extend on both opposite sides 828, 830 of brush 810 proximate to mouth 636 prime. As shown by FIG. 6, side grips 840 comprise an inset layer of soft compressible rubber-like elastomeric material such as SANTOPRENE™ which is resistant to paint solvents and which is co-molded into opening formed in rigid core material 831 each of sides 828, 830. As a result, side grips 840 are preferably fused to handle 812. Side grips 840 overlap internal ferrule 614 and bristles 616, as well as the interior cavity 638. Side grips 840 and locators 950 are substantially identical to grips 840 and locators 850 each 2.25 inches. In this embodiment, side grips 840 have an arrangement of at least one color which is visually distinguishable from non-grip locator portions 841 surrounding side grips 840. As a result, side grips 840 provide the painter with multiple cues as to how he or she should grip paint brush 810. In particular, in contrast to the generally rigid material forming non-grip locator portions 841, side grips 840 have a soft elastomeric material providing a touch cue. Side grips 840 may additionally be provided with texture or roughness distinct from non-grip locator portions. In addition, side grips 840 provide a visual cue to the painter as to whether he or she should grip paint brush 810. The arrangement of colors may simply comprise a single color distinct from the color provided to the non-grip locator portions 841 to form cues or may comprise multiple colors, wherein at least one color is different from the colors chosen for the non-grip locator portions. Furthermore, side grips 840 may be provided with the identical colors as chosen for non-grip locator portions 841 where the colors chosen for side grips 840 are arranged in a distinct pattern or graphic representation. Side grips 840 provide a soft easily gripped surface for the painter’s thumb and fingers on opposite sides 828, 830 of brush 810.

[0102] Locator 850 is substantially similar to locator 650 except that locator 850 has an inset, preferably co-molded, layer of soft compressible rubber-like material such as SANTOPRENE™. As with side grips 840, locators 850, positioned on opposite spines 632 prime, 634 prime provide a soft easily gripped surface against which the tip of the painter’s point or index finger may be pressed. In addition to providing a more easily grippable surface, grips 840 and locators 850 also encourage proper gripping of brush 810. In particular, the soft compressible material used to form grips 840 and 850 encourage the painter to position his/her fingers and thumb on top of side grips 840 and to position his/her index finger on one of locators 850. Brush 810 enables an amateur painter to quickly and easily identify proper finger and thumb positioning by feel due to the different compressibility and texture of grips 840 and locators 850. In this embodiment, grips 840 and locators 850 are preferably provided with a distinctive color from the remaining undesirable possible gripping locations of handle 812 to provide the painter with an additional visual cue as to proper finger and thumb positioning.

[0103] FIG. 8 illustrates brush 910, an alternative embodiment of brush 810. Brush 910 is similar to brush 810 except that brush 910 includes side grips 940 and locators 950 in lieu of grips 840 and locators 850, respectively. Grips 940 and locators 950 are substantially identical to grips 840 and locators 850 except that grips 940 and locators 950 each additionally include projecting elastomeric or rubber-like ribs 957. In addition, side grips 940 are also configured so as to be slightly concave. The cavity of side grips 940 and the additional provision of ribs 957 provide the painter with enhanced grip of brush 910. In addition, the parallel nature of ribs 957 adds to the sleek attractive design of brush 910 providing a unique aesthetic appearance.

[0104] FIGS. 9 and 10 illustrate brush 1010, an alternative embodiment of brush 910. Brush 1010 is similar to brush 910 except that brush 1010 includes side grips 1040 in lieu of side grips 940. As shown by FIG. 23, side grips 1040 are each generally bulbous and convex in shape along sides 928 and 930. In this embodiment, side grips 1040 are made from a soft compressible rubber-like elastomeric material such as SANTOPRENE™ which is resistant to paint solvents. Side grips 1040 preferably overlie a hollow cavity 1057 such that side grips 1040 may be pressed inwardly or squeezed inwardly towards one another during gripping of brush 1010. Upon release of brush 1010, side grips 1040 resiliently return to the original convex bulbous shape. Similar to side grips 940, side grips 1040 encourage the painter to properly position his/her fingers and thumb about brush 1010. Side grips 1040 are also preferably provided with a distinctive color to visually cue the painter as to the proper positioning of his/her fingers and thumb. This variation in color also adds to the aesthetic appearance and attractiveness of brush 1010 as does the symmetrical circular shape of side grips 1040.

[0105] FIGS. 11A-11E and FIGS. 12A-12E illustrate paint brushes 1110 and 1210, respectively. Brushes 1110 and 1210 incorporate some of the same features of brush 610 and also include finger positioning cues. Portions 1115 of brushes 1110 and 1210 are formed from a soft, compressible elastomeric material that is solvent resistant such as SANTOPRENE™. This layer of SANTOPRENE™ overlays a rigid underlying layer of material, such as polypropylene or polyethylene and is preferably co-molded to provide a continuous and relatively smooth outer surface to each of brushes 1110 and 1210. For brevity of discussion, those structural configurations of brushes 1110 and 1210 which correspond to brush 610 are numbered similarly except that such elements additionally include a double prime designation to reflect the fact that minor changes in the shape may have been implemented for aesthetic purposes while still maintaining the basic functional qualities.

[0106] FIGS. 13A-13F and 14 illustrate paint brush 1310. As best shown by FIG. 14, paint brush 1310 generally includes handle 1312, internal ferrule 614 (described with respect to paint brush 610) and bristles 1316. Handle 1312 is generally formed from a single unitary body of material molded so as to have the shape and configuration shown. Handle 1312 is preferably formed from polypropylene or polyethylene. Handle 1312 may alternatively be formed from other materials such as nylon. Handle 1312 generally includes shaft or body 1320, neck 1322, head 1324, mouth 1326 and throat 638 (discussed above with respect to brush 510). Body 1320 comprises an elongate narrow of brush handle 1312 extending from neck 1322 away from head 1324. Body 1320 generally extends along a centerline or axis 1327 that is offset relative to the center line 1329 of bristles 1316. In particular, handle 1312 is offset closer towards the upper edge 1331 of brush 1310 to allow the painter to position his or her index finger along the upper
edge 1331 more easily. Centerlines 1327 and 1329 are preferably offset from one another by a distance of between about 0.25 inches and about 1.25 inches. In this embodiment, centerlines 1327 and 1329 are offset from one another by a distance D of approximately 0.55 inches.

[0107] Neck 1322 extends between body 1312 and head 1324. Neck constitutes a juncture where head 1324 widens from handle 1320. Although neck 1322 is illustrated as having substantially the same diameter as body 1320, neck 1322 may alternatively have a narrower diameter compared to body 1320.

[0108] Head 1324 extends from neck 1322 towards bristles 1316 and generally includes opposing faces having sides 1328, 1330, upper spine 1332, lower fin 1334, mouth 1336 and throat 638 (shown in FIG. 32). Sides 1328, 1330 are substantially identical to one another and extend opposite one another between spine 1332 and lower fin 1334.

[0109] Spine 1332 extends along an upper edge of head 1324 between neck 1322 and mouth 1336. Spine 1332 generally includes support surface 1348 and locating surface 1350. Support surface 1348 generally extends from neck 1322 forwardly substantially past lower fin 1334 to located surface 1350. Support surface 1348 arcuately extends from neck 1322 forwardly towards bristles 1316 so as to provide a surface upon which the painter’s index finger may contact and rest upon while the tip of the painter’s index finger is positioned over and against located surface 1350. Support surface 1348 preferably extends in a smooth arc between neck 1322 and located surface 650. At the same time, support surface 1340 is preferably rounded so as to smoothly blend into sides 1328 and 1330. Similar to support surface 648, support surface 1348 preferably has an arcuate slope no greater than 20 degrees. In particular, the distance or change in height dy over the corresponding change in length dx between any two points along support surface 1348 has an absolute value less than one.

[0110] Locator surface 1350 comprises a depression or concavity extending along spine 1332 between sides 1328, 1330 and slightly forward or over top a front portion of lower fin 1334. Locator surface 1350 preferably has a depth sufficient to retain the tip of the painter’s index finger in place during painting. The concavity or the depression forming locator 1350 preferably has a front surface 1354 extending between sides 1328, 1330 and forward the incline to serve as a stopping surface resisting forward motion of the painter’s index finger. Front surface 1354 of locator 1350 is preferably spaced from mouth 1336 by a distance no greater than 0.75 inches. In this embodiment, surface 1354 at least partially overlaps internal cavity 638 or internal ferrule 614. Depending upon the length of bristles 616, surface 1354 may also overlap the axial ends of bristles 616. The depression or concavity forming locator 1350 also preferably includes a rearward inclined surface 1356 extending between sides 1328, 1330 that facilitates the painter applying a rearward force to brush head 1324 with his or her index finger.

[0111] Lower fin 1334 comprises a thinner portion of head 1324 extending below sides 1328, 1330 from neck 1322 and terminating just prior to mouth 1336. Because lower fin 1334 extends to neck 1322, the painter’s thumb and lower three fingers including the middle finger, ring finger and pinky, may easily reach and bear against the side surfaces of fin 1334. Because lower fin 1334 is narrower than sides 1328, 1330, fin 1334 forms a shoulder surface 1359 extending between fin 1334 and each of sides 1328, 1330. Shoulder surface 1359 provides a stop against which the painter’s thumb may press against. In addition, because fin 1334 is thinner than sides 1328, 1330, fin 1334 further enables the painter’s thumb to be positioned closer to center line 1329 of brush 1310. It has been found that this further provides the painter with an even more comfortable grip.

[0112] Mouth 636 extends along a forwardmost end of head 1324 between the outer surfaces of head 1324 and throat 638. Throat 638 is described with respect to brush 610 and receives and retains internal ferrule 614 as well as the bristle ends secured within the internal ferrule 614.

[0113] FIGS. 16A-16F and 17A-17F illustrate paint brushes 1410 and 1510, respectively. Paint brushes 1410 and 1510 are similar to paint brush 1310 except that paint brushes 1410 and 1510 includes soft, compressible elastomeric layer portions as indicated by similarly shaded areas referred to by reference number 1515. Elastomeric layer portions 1515 overlie a core of rigid material. In these embodiments, elastomeric layer portions 1515 are co-molded with material 1517 which serves as the underlying core material and which is generally flush with portions 1515 along the outer surface of brushes 1410 and 1510. In this embodiment, the elastomeric material comprises ANTOPRENE™. Alternatives to other elastomeric materials which are resistant to paint solvents may be used. The characteristics of the elastomeric layer of material and the co-molding processing itself are generally described in U.S. Pat. No. 6,138,313 filed on Apr. 29, 1997, the full disclosure of which is hereby incorporated by reference. The soft elastomeric layer portions 1515 provide a soft outer comfortable grip for brushes 1410 and 1510. In addition, soft elastomeric layer portions 1515 also serve as positive visual cues to a painter to suggest to the painter as to where and how he or she should grip brush 1410 or brush 1510. Preferably, portions 1515 are colored differently than the rigid material 1517. In addition, portion 1515 also provide a textural cue as to where and how a painter should grip brush 1410 or brush 1510. In addition to the above noted functional advantages, elastomeric outer layer portion 1515 also provides brush 1410 and brush 1510 with an extremely aesthetically pleasing appearance. As will be appreciated, the precise extent of coverage of portions 1515 and core material 1517 may vary to provide alternative aesthetic qualities yet maintain the functional advantages of portions 1515 serving as brush grip cues.

[0114] FIGS. 18A-18E illustrate paint brush 1610. Paint brush 1610 generally includes handle 1612, ferrule 614 (shown in FIGS. 32-35) and brush bristles 1616. Handle 1612 generally includes a bulbous portion comprising a sphere 1620 and head 1624. Sphere 1620 generally consists of a ball or partial ball having a radius such that sphere 1620 fits within a palm of a painter’s hand when brush 1610 is being gripped. Sphere 1620 preferably has a spherical surface having a radius of between about 0.5 inches and about 1.25 inches. In this embodiment, sphere 1620 has a radius of approximately 1 inch. Sphere 1620 is affixed to head 1624 at a distal end of head 1624. Sphere 1620 has an axial end-most point 1625 spaced from mouth 1336 by a distance of at least about 3 to 5 inches. Surface 1625 is preferably spaced from mouth 1336 by a distance no greater than about
6 inches. As a result, sphere 1620 fits within the painter’s palm, while enabling the painter’s thumb and fingers to grip against head 1624. In this embodiment, sphere 1620 is formed from a soft, compressible paint solvent resistant elastomer such as SANTOPRENE™. Although less desirable, sphere 1620 may alternatively be formed from a rigid non-compressible material such as a rigid plastic. Sphere 620 is preferably fixed to head 1624. Alternatively, sphere 1620 may be rotatably supported within a socket provided by head 1624. Sphere 1620 provides a soft yet comfortable grip and fits within a painter’s palm to reduce painter fatigue.

[0115] Head 1624 extends from sphere 1620 towards bristles 1616 and generally includes thumb slide 1640 in each generally flattened side of head 1624 and locater 1650 along the upper and lower spines 1632 and 1634 of head 1624. Spines 1634, 1634 each further include a landing or support surface 1648 which arcuate extends from sphere 1622 and locater 1650. Support surfaces 1648 provide a surface against which the painter’s index finger may rest and press against when the tip of the painter’s index finger is positioned within locater 1650. Head 1624 is preferably formed from a rigid material such as a rigid polymer such as polyethylene, polypropylene or nylon.

[0116] Although not specifically illustrated, head 1624 may include selected portions which are co-molded with an outer layer of soft, compressible paint solvent resistant elastomeric material such as SANTOPRENE™. Preferably, such soft elastomeric layers would extend in thumb slide 164 and thumb 1640 in that locater 1650, the pressure points where brush 1610 is squeezed. In such an alternative embodiment, the elastomeric layers would also provide the painter with positive visual and textural cues as to how brush 1610 should be gripped. Such elastomeric layers would preferably be formed from different colors as compare to the remaining non-elastomeric portions of head 1624.

[0117] As shown by FIG. 18A and 18E, head 1624 terminates at mouth 1336 which extends adjacent to internal cavity 638 shown and described with respect to FIGS. 23-25. As described with respect to FIGS. 23-25, brush bristles 1616 are mounted within ferrule 614 which is positioned within internal cavity or throat 638 of head 1624. As a result, head 1624 is shorter in length yet provides thumb slide 1640 and locater 1650 since a ferrule is not required to be secured to the outside of head 1624. In this embodiment, the forward-most portions of locaters 1650 are spaced from mouth 1336 by a distance no greater than 2.25 inches. In this embodiment, locaters 1650 are spaced from mouth 1336 by a distance of 0.3630 inches. In the preferred embodiment, locaters 1650 overlap the internal cavity 638 and the internal ferrule 614 (shown and described with respect to FIGS. 19-22). Surfaces 1650 further lap the axial ends of bristles 1616. Because head 1624 is shorter in length, the painter may grasp handle 1612 and head 1624 closer to mouth 1336, enabling the painter to have greater control over paint brush 1610 and further reducing the amount of force required to maintain a sure grip of paint brush 1610. As will be appreciated, brush 1610 may have various other aesthetic characteristics while still providing the noted functional advantages.

[0118] FIGS. 19A-19F illustrate paint brush 2210, an alternative embodiment of the paint brush shown in FIGS. 13A-13F and 14, the paint brush shown and described with respect to FIGS. 16A-16F or the paint brush shown in and described with respect to FIGS. 17A-17F. Paint brush 2210 is similar to paint brushes 1310, 1410 and 1510 except that paint brush 2210 includes elastomeric portion 2215 overlaying the rigid plastic material of the core (indicated by reference numeral 2217). The configuration of the elastomeric layer portions 2215 and the non-elastomeric portions 2217 indicates to a painter where or how the painter should position his or her hands about brush 2210. The particular arrangement of layers 2215 and 2217 provides an aesthetically attractive and appealing paint brush. In alternative brushes, layers 2215 and 2217 may have alternate configurations while still indicating to the painter where the painter should place his or her hand. Moreover, in alternative applications, the entirety of the handle of brush 2210 may be overlaid with an elastomeric material.

[0119] FIGS. 20A-20F illustrate paint brush 2310, an alternate embodiment of paint brush 1610 shown and described with respect to FIGS. 18A-18E. Paint brush 2310 is similar to paint brush 1610 except that paint brush 2310 includes bulbous portion 2320 in lieu of sphere 1620. In addition, paint brush 2310 includes elastomeric layer 2315. In contrast to sphere 1620, bulbous portion 2320 (as shown in FIG. 51), has a generally oval shape and extends generally along an axis A1 which is downwardly angled from axis A2 which generally extends parallel to the brush bristles or filaments 2316 (shown generally in phantom). It has been found that this configuration comfortably conforms to the painter’s hand and natural grip of brush 2310. In particular, because bulbous portion 2320 has an oval shape (when viewed from the top as shown in FIG. 20C), the surface of handle 2312 between portion 2320 and head 2324 has a larger radius so as to more gradually blend with head portion 2324 at blending bend region 2325. Because bulbous portion 2320 is generally flatter and less sharp along the point where bulbous portion 2320 merges into head portion 2324, which is adjacent to bristles 2316, less open space exists between handle 2312 and the inner surface of the painter’s palm or hand, providing the painter with a more comfortable grip. Because bulbous portion 2320 is angled downward with respect to the center line of head 2324 or the line generally extending parallel to the brush filaments, handle 2312 better conforms to painters having differently sized hands. When gripping properly, the painter’s thumb will be positioned on one face of handle 2312 while the painter’s middle finger will be positioned on an opposite face of handle 2312. The painter’s ring finger is positioned in a less pronounced locater 2350 along a top spine of handle 2312.

[0120] Locater 2350 generally comprises an elevated ridge proximate mouth 1336. The elevated ridge forms a slight indentation or recess into which the painter’s index finger may be located. The recess forming locater 2350 is spaced from mouth 1336 by a distance no greater than 2.25 inches. Locater 2350 overlaps the internal cavity and internal ferrule until cavity 638 and the internal ferrule 614 (shown and described with respect to FIGS. 23-25). In the particular embodiment, locater 2350 further overlaps the axial ends of bristles 2316.

[0121] In addition to locater 2350, paint brush 2310 further includes a natural bend region 2325. When gripping paint brush 2310, the painter’s pinky and ring finger pref-
erably wrap around an underside 2327 of handle 2312 at the bend region 2325. The junction area or bend region 2325 forms a natural groove in which the painter’s pinky and ring finger may be located.

[0122] As further shown by FIGS. 20A-20E, elastomeric layer 2315 extends along selected portions of handle 2312 which predominantly come in contact with the painter’s hand. In this embodiment, selected portions of handle 2312 include non-elastomeric layers 2317 which are generally flush with layers 2315 and which are preferably provided with a distinct color from the color of layers 2315. Layers 2315 provide a soft surface against which the painter may grip handle 2312. The relationship and configuration of layers 2315 and 2317 provides handle 2312 of brush 2310 with a unique aesthetically attractive appearance. In alternative embodiments, handle 2312 may alternatively be entirely coated with an elastomeric layer 2315 formed from such material as SANTOPRENE™. Although less desirable, layer 2315 may alternatively be entirely omitted.

[0123] In this embodiment, bulbous portion 2320 extends downwardly along axis A1 at an angle between approximately 30 and 60 degrees with respect to axis A2. In the most preferred embodiment, bulbous portion 2320 extends along axis A1 at an angle of about 50 degrees with respect to axis A2. In this embodiment, the distant-most surface 2327 of bulbous portion 2320 is spaced from end 2325 by a distance of at least 1.5 inches and a distance no greater than 3 inches. Surface 2327 is further spaced from mouth 1336 by a distance no less than 3 inches and a distance no greater than 5 inches. Bulbous portion 2320 generally has a width W of at least 1 inch and no greater than 2 inches as shown in FIG. 20C. Bulbous portion 2320 has a length L no less than about 1.5 inches and no greater than about 3 inches as shown in FIG. 20B.

[0124] FIG. 21 is a perspective view of paint brush 2350. Paint brush 2350 is identical to paint brush 2310, except that paint brush 2350 includes elastomeric gripping layers 2355 at particular locations along the surface of handle 2312 to cue the painter as to where the user should place his or her fingers when gripping paint brush 2350. In particular, paint brush 2310 includes layers of soft compressible or rubber-like material such as SANTOPRENE™ at locations corresponding to locations 2350 and bend 2325. In alternative embodiments, paint brush 2350 may be provided with elastomeric gripping layers in alternative or additional locations corresponding to surfaces against which the painter should grip handle 2312 or apply directed pressure to handle 2312.

[0125] FIGS. 22A-22E illustrate paint brush 2410, an alternative embodiment of paint brush 2310 depicted in FIGS. 5A-5E. Paint brush 2410 includes a crater 2440 surrounded by a raised ridge 2442 between crater 2440 and brush bristles 2416. Crater 2420 extends on opposite faces or sides of brush 2410 and is sized to receive the painter’s fingers and thumb when brush 2410 is properly gripped. Brush 2410 further includes elastomeric layers 2415 formed from a soft compressible elastomeric material such as SANTOPRENE™. Brush 2410 also includes portions 2417 which are not provided with an overcoating or overlay of elastomeric material. As a result, layers 2415 provide the painter with positive identification of where he or she should position his or her fingers when gripping brush 2410. In addition, brush 2410 is provided with a sleek and attractive aesthetic appearance. As will be appreciated, layers 2415 may have various other shapes and extents of coverage while still indicating to the painter the proper positioning of the painter’s fingers and thumb about brush 2410. In alternative embodiments, the entirety of handle 2412 may be overcoated with an elastomeric layer of a single color or of multiple colors. In particular applications, particular portions of the elastomeric layer may be differently colored to provide the painter with more specific guidelines as to the proper positioning of his or her handle about brush 2410 when painting. Although less desirable, elastomeric layers 2415 may alternatively be replaced with a rigid layer such as layer 2417 which may or may not be part of an internal rigid core of brush 2410.

[0126] Each of the paint applicator handles described herein is specifically adapted to promote a relaxed hand posture when being gripped. In particular, the handles are specifically configured to nest within the painter’s hand when being gripped. In the preferred embodiments, the shape and dimension of the handles and the bodies of such handles are based upon anatomical dimensions of a human hand when that hand is in a relaxed hand posture. As a result, such brush handles are more comfortable and less fatiguing to grip and manipulate.

[0127] Moreover, such brush handles additionally include at least one grip locating cue which indicates a proper gripping location on the handle for achieving a relaxed hand posture. In particular, the handles described utilize either texturally distinct surfaces, visually distinct color arrangements or distinctively shaped surfaces to indicate to the user or painter where and how he or she should position his or her fingers, thumb and palm about the handle being grasped.

[0128] In each of the paint brushes described herein which include a soft grip covering, the covering itself is overlaid upon a rigid core. The thickness of the soft grip covering will vary from a thickness of on the order of from about 0.030 inches to about 0.125 inches. Below 0.030 inches it will be difficult to push the material over the length of the core through such a small space. If the cover material is thicker than about 0.125 inches the flow will be excellent, but the final structure may be too flexible for easy use, and the cost would increase considerably since the cover material is more costly than the material from which core is made. More preferably, the thickness of the cover material should be on the order of from about 0.050 inches to about 0.075 inches.

[0129] The core material is preferably polypropylene. The preferred over-grip or cover grip material is a thermoplastic elastomer (TPE). An example would be SANTOPRENE, which is a polypropylene based TPE with vulcanized rubber dispersed in it. SANTOPRENE is solvent resistant. In particular, SANTOPRENE is sufficiently resistant to the following solvents so as to experience a weight change of less than 40 percent following ASTM test procedure D-471: 98% Sulfuric Acid; 10% Hydrochloric Acid; 50% Sodium Hydroxide; 10% Potassium Hydroxide; Water; Ethanol; n-Hexane; MethylEthylKetone; Acetone; Mineral Spirits; n-Octane; and n-Pentane.

[0130] Since both materials of the case and the grip material are polypropylene based, a better chemical and/or heat bond between both substrates exists than there would be
with dissimilar materials. It will be understood that a bond may be formed by heat fusion or chemical reaction or both heat fusion and chemical reaction depending on the specific materials, times, temperatures and pressures utilized. Most preferably the cover is secured to core not only by the mechanical interlocks but also, to some degree, by a bond provided by heat and/or chemical means.

[0131] Other materials could be used for the core material, such as a polyethylene with the Santoprene TPE over-grip. Both materials are in the polyolefin family and would bond and work, but probably not as well as the same material based components. Other base materials such as blends of polypropylene and polyethylene could also be used.

[0132] Still other material combinations could be used. For example, Krayton is a styrene based TPE which could be used. It would not be as effective as Santoprene since the base material is styrene which does not have nearly as good solvent resistance to paint solvents as does Santoprene. It would be acceptable for latex or water based systems but not solvent based coatings. Polyvinylchloride (PVC) can also be used but like Krayton the PVC has limited resistance to non-water based solvents. A number of other core and over-grip materials could be used to make this type of brush handle but the materials described above both have a relatively high resistance to all paint solvents and a low manufacturing cost for an integrally molded handle.

[0133] As mentioned, the foregoing description pertains to a two-shot molded handle. Other handle designs could also be used such as sliding a premolded sleeve of a grip material over a core handle. A TPE, PVC, polyester or urethane foam or even a rubber material could be slid over a core handle. This slide on could be similar to a bicycle handgrip or it could be mechanically trapped in a recess but significant disadvantages to said alternative processes exist to the point where the illustrated and described construction is much preferred.

[0134] Each of the paint applicators described in the present disclosure is described as a paint brush having a plurality of filaments or bristles arranged into a cluster and held together by a ferrule which is received within an internal cavity of a paint handle. In lieu of the aforementioned preferred embodiments, each of the described handles may alternatively be coupled to a pad. A multitude of paint applying media may be used with the above-described handles so long as such media are capable of absorbing or carrying paint, varnish, stains and other liquid coatings and releasing such coatings upon a surface. In lieu of such paint applying media being coupled to the handle at least partially by means of a ferrule disposed within an internal cavity of the handle, such paint applying media may be directly affixed to the handle by other structures excluding a ferrule. In addition, the paint applying medium may be coupled to the handle by means of ferrule at least partially secured to an exterior surface of the handle rather than being disposed within an internal cavity of the handle.

[0135] The paint applicators described in the present disclosure are intended to be held and manipulated more easily. According to an exemplary embodiment, data relating to the size, shape, etc. of a potential user’s hand(s) (e.g., "anthropometrics" data) may be used to design and configure the paint applicators. Such anthropometric data may be arranged to provide a range of values used to guide design. According to an exemplary method, a range may be established from a statistically small female hand (e.g., 5%) to a statistically large male hand (e.g., 95%). Such data may be used to guide design (e.g., the size, shape, other dimensional characteristics, etc.) of the paint applicators. Alternatively, such data may be used to establish approximate ranges from which further design modification may be made (e.g., base preliminary design from anthropometric data and then make modifications based on testing, prototyping, etc.).

[0136] For example, for paint applicators described herein having a finger groove area (i.e., an area where the user’s index finger can rest on a side of the brush (e.g., on the narrow side of the brush such as locator surface 650 in FIGS. 3 AND 4)), the anthropometric data ranges that may be used for the feature are:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Female Range</th>
<th>Male Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Length of index finger</td>
<td>2.4 inches</td>
<td>3.2 inches</td>
</tr>
<tr>
<td>2. Width at tip of index finger</td>
<td>0.5 inches</td>
<td>0.8 inches</td>
</tr>
</tbody>
</table>

[0137] Employing such anthropometric data ranges, the length L of such finger grooves, as shown by FIG. 3, beginning at front surface 654 and extending rearwardly, preferably accommodates the offset of at least a 5% statistically female hand. Employing such data as indicated in paragraph 137 below, the length L of such finger grooves as 650 should at least be approximately 0.9 inches.

[0138] Alternatively, for paint applicators described herein having a thumb groove area (i.e., an area on the wide surface of brushes that is recessed to accept placement of the user’s thumb such as thumb slide 640 in FIG. 3), the anthropometric data ranges that may be used for the feature are:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Female Range</th>
<th>Male Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Length of thumb</td>
<td>1.8 inches</td>
<td>2.6 inches</td>
</tr>
<tr>
<td>2. Width at tip of thumb</td>
<td>0.7 inches</td>
<td>1.1 inches</td>
</tr>
</tbody>
</table>

[0139] Utilizing such data ranges, the preferred distance from the forwardmost point of thumb slide 642 to the mouth 636 is at least the difference between the length of the thumb of that a 5% statistical female hand and a 95% statistical male hand. In the preferred embodiment, this length is at least 0.8 inches. The area of thumb slide 640 preferably has a diameter at least greater than the diameter of a 5% statistical female hand. In the preferred embodiment, the thumb slide area is at least 0.7 inches in diameter.

[0140] 3. Offset between finger pads and thumb (e.g., when hand is in a gripping posture with fingers curved slightly), which is shown generally as reference numeral 653 in FIG. 4.
Alternatively, for a grip span (i.e., the distance between the user’s thumb and fingers (e.g., for providing the depth of paint applicator handle in the grip areas), which is shown generally as reference numeral 651 in FIG. 4), the anthropometric data range may be based on a 5% female providing 0.75 inches maximum grip span. As such, it is intended to position the thumb and finger joints in a “neutral” and comfortable posture.

Alternatively, for paint applicators providing a mound, the position (identified generally by hump 642) of the anthropometric data ranges of the “mound” that may be used for the feature are:

1. Length of middle finger (range):
   - 5% female = 2.8 inches
   - 95% male = 3.7 inches
2. Length of little finger (range):
   - 5% female = 1.9 inches
   - 95% male = 2.8 inches

Using such anthropometric ranges, the preferred distance from hump 642 to the mouth 636 of brush 612 is preferably at least 0.75 inches.

Alternatively, for paint applicators having a “ball grip,” the ball grip may be generally designed (e.g., with a diameter 1621 in FIG. 18B) for a statistically small female hand (5%), which provides a range of 1.0 inch to 1.75 inches in diameter (nominally between approximately 1.0 inches to approximately 1.50 inches) (e.g., to maintain a neutral and comfortable wrist posture).

Alternatively, for paint applicators having a “ball grip ridge” (shown generally having a reference numeral 1651 in FIGS. 18A and 18C, e.g., near the applying media (e.g., bristles), the configuration and position of the “ball grip ridge” may be based on ranges of finger lengths. Such ranges that may be used for the feature are:

1. Length of index finger (range):
   - 5% female = 2.4 inches
   - 95% male = 3.2 inches
2. Length of middle finger (range):
   - 5% female = 2.8 inches
   - 95% male = 3.7 inches
3. Length of little finger (range):
   - 5% female = 1.9 inches
   - 95% male = 2.8 inches

Using such anthropometric data ranges, the distance D (as shown in FIG. 18B) is preferably sufficient to accommodate the length of the 5% statistical female middle finger (adjusted 0.3 inches downward to accommodate some curvature) and the length of a 95% statistical male middle finger. In the preferred brush, this range is from approximately 2.5 inches to approximately 3.7 inches.

According to other alternative and exemplary embodiments, any of a variety of data, ranges, percentile, and the like may be used to guide the design of the paint applicators such as those described herein. Additionally, such statistical and computational methods may be used to supplement other design and configuration techniques. Further, while only a few paint applicators were referenced above, such design and configuration techniques apply to other types of paint applicators described in the present disclosure.

FIGS. 23-26 illustrate one preferred method for forming any one of brushes 610-2410 in which ferrule 614 is secured within throat 638 of the particular brush head. FIG. 23 is a perspective view illustrating brush handle 1710, ferrule 638 and brush bristles 1716 secured to ferrule 638 prior to insertion of ferrule 638 into throat 638 of brush head 1710. FIG. 33 is a sectional view of brush head 1710, ferrule 638 and brush bristles 1716 taken lines 33-33 of FIG. 32. As best shown by FIG. 33, throat 638 includes a plurality of circumferentially extending grooves 1720 formed therein. Ferrule 614 includes a plurality of outwardly extending projecting ribs 1724 corresponding to grooves 1720. During insertion of ferrule 614 into throat 638, ferrule 614 flexes or is resiliently compressed so as to position ribs 1724 in grooves 1720 and to thereby secure ferrule 614 within throat 638. As will be appreciated, the relationship between grooves 1720 and ribs 1724 may be reversed whereby interior surfaces about throat 638 are provided with ribs and whereby the exterior surface of ferrule 614 is provided with corresponding grooves.

To enable ribs 1724 or the portions of ferrule 614 supporting ribs 1724 to flex during insertion of ferrule 614 into throat 638 of head 1724, ferrule 614 is preferably formed from a rigid yet somewhat yet sufficiently flexible plastic such as polypropylene. Alternatively, the internal surface of throat 638 may be formed from a material that flexes to allow insertion of ribs 1724 into grooves 1720. Furthermore, at least one of ferrule 614 or the inner surface about throat 638 may be formed from a material which during some state, such as prior to completely cooling after being molded is sufficiently flexible to allow insertion of ferrule 614 into throat 638. However, in a later state, such as after either ferrule 614 or the internal surface about throat 638 has completely cooled, such material is no longer flexible whereby ferrule 614 is locked in place within throat 638 of brush head 1724.

In an alternative embodiment, internal cavity or throat 638 includes a pair of opposing inwardly extending surfaces provided by grooves or teeth. Ferrule 614 includes a pair of opposing fingers or tabs having a pair of opposing outwardly extending surfaces such as teeth. During insertion of ferrule 614 into throat 638, the fingers or tabs inwardly flex before reaching the inwardly extending surfaces. Once the outwardly extending surfaces of ferrule 614 are positioned behind the inwardly projecting surfaces (i.e., closer to the proximal end of the handle), the tabs resiliently return towards their initial shape under load to position the out-
wardly projecting surfaces in a locking relationship with the inwardly extending surfaces to prevent withdrawal of the ferrule 14 from throat 638. As a result, the ferrule and the attached brush bristles may be simply snapped into place within the brush head. In one particular embodiment, the ferrule provides an outer lip which engages mouth 638 of brush head 38 of the brush head and redefines a mouth through which the bristles extend.

[0151] As best shown by FIGS. 24 and 26, brush bristles 1716 are partially spaced from one another by spacer or plug 728 comprising a cardboard, felt or plastic ledge and are secured to ferrule 614 by an adhesive 1730 which preferably comprises an epoxy. Because of epoxy does not bond well with most plastics such as the plastic preferably forming ferrule 614, ferrule 614 additionally includes dimples 1734. Dimples 1734 are illustrated in greater detail in FIG. 34. As shown by FIGS. 33 and 34, dimples 1734 comprise small pits extending into ferrule 614 opposite epoxy 1730. The pits provide additional surface to which epoxy 1730 may bond to ferrule 614. In addition, epoxy 1730 also fills dimples 1734 and, once hardened, further forms a mechanical interlock between epoxy 1730 and ferrule 614. Dimples 1734 are preferably formed within the interior surface of ferrule 614 by providing a mold with protuberances corresponding to each of dimples 1734. Prior to the material forming ferrule 614 completely hardening, the mold is withdrawn whereby the ferrule 614 resiliently flexes outwardly to allow for the withdrawal of the inner mold while preserving the formed dimples 1734. After withdrawal of the internal mold, ferrule 614 is allowed to complete its hardening. Alternatively, the internal mold may include protuberances corresponding to dimples 1734 that are resiliently flexible such that once ferrule 614 has hardened, the mold may be withdrawn whereby the protuberances flex to allow the withdrawal from the formed dimples 1734.

[0152] FIGS. 27 and 28 illustrate a method of forming a brush 1810 having a throat 638 in which a ferrule 614 is positioned. FIG. 36 illustrates a core 812 of brush 1812 including plug 1814 and shoulders 1815. Core 1812 is preferably formed from a rigid polymeric material such as polyethylene, polypropylene or nylon. Alternatively, core 1812 may be formed from other rigid materials. FIG. 27 further illustrates ferrule 614 which is preferably formed from a rigid polymer or plastic. Ferrule 614 includes an internal cavity 815 into which brush bristles 1816 are spaced from one another by a space or a plug 1828 (a cardboard, velvet or plastic wedge) and in which bristles 816 are secured to ferrule 614 by an adhesive 1830 such as an epoxy.

[0153] Ferrule 614 itself is preferably formed from a rigid polymer such as polyethylene, polypropylene or nylon. Ferrule 614 preferably includes mechanical interlocking members 1824 on its external surface. In this embodiment, locking members 1824 comprise externally extending ribs or projections. Alternatively, locking members 1824 may comprise grooves or depression.

[0154] As shown by FIG. 28, ferrule 614 is positioned so as to receive plug 1814 or core 1812. In this embodiment, ferrule 614 is secured to core 1812 by sonic welding or kinetic welding. Alternatively, ferrule 614 may be secured to core 1812 by adhesives, by mechanical fasteners or by fusing compatible materials from which core 1812 and ferrule 614 are preferably formed. Although less desirable, ferrule 614 may be simply positioned over plug 1814 without additional securing means.

[0155] Once ferrule 614 is positioned over plug 1814, an outer layer of material 1830 is co-molded over both core 1812 and ferrule 614. Material 1830 preferably comprises a soft, compressible elastomer such as SANTOPRENE™. Alternatively, material 1830 may comprise a rigid, relatively inflexible plastic. Material 1830 forms a mechanical interlock with locking members 1824 to further retain ferrule 614 to core 1812.

[0156] FIGS. 29, 30 and 31 illustrate an alternative method for forming any of brushes 610-2410. Brush 1910 having a ferrule 1914 positioned within an inner cavity or throat 638 of a brush head 1924 is an example of a brush formed by the brush forming method. As shown by FIG. 38, brush 1910 is preferably formed from a pair of opposite clamp shells 1912, 1914. Clamp shells 1912 and 1914 are configured to mate with one another and to capture ferrule 1914 therewith between throat 638 defined by opposite internal recesses in head 1924 of shells 1912, 1914.

[0157] Ferrule 1914 is substantially identical to ferrule 614 except that ferrule 1914 includes two openings 1918 therethrough. Like ferrule 614, ferrule 1914 has an interior into which brush bristles 1916 are spaced by a spacer or plug formed from velvet, cardboard or plastic and in which ends of brush bristles 1916 are secured to ferrule 1914 by means of an adhesive such as epoxy.

[0158] As shown by FIGS. 30 and 31, shell 1912 includes a plurality of hollow bosses 1930. Shell 1914 includes a plurality of plugs 1932 which correspond to bosses 1930. As shown by FIG. 39, when shells 1912 and 1914 are brought together, plugs 1932 and bosses 1930 project through openings 1918 and ferrule 1914, whereby bosses 1913 receive plugs 1932. Along the rest of brush 1910, bosses 1930 also receive plugs 1932 to snap and retain shells 1912 and 1914 to one another about ferrule 1916. Although brush 1910 is illustrated as employing bosses 1930 and plugs 1932 to secure shells 1912 and 1914 to one another, various other mechanical locking means and fastening means may be used to secure shells 1912 and 1914 to one another about ferrule 1914.

[0159] Once shells 1912 and 1914 are secured to one another, shells 1912 and 1914 are at least partially covered with an overmold of plastic material. Preferably, the plastic material comprises a soft, compressible elastomer such as SANTOPRENE™. The plastic material serves to seal the juncture of shells 1912 and 1914 as well as to provide brush 1910 with desired contours to insure comfortable gripping and the desired aesthetic characteristics. Although less desirable, brush 1910 may alternatively be formed without overmolding a plastic material over shells 1912 and 1914.

[0160] Although shells 1912 and 1914 are illustrated as being permanently fixed or mounted to one another about ferrule 1916 by means of permanent fasteners such as bosses 1930 and plugs 1932, and by means of an overmold of plastic, shells 1912 and 1914 may alternatively be releasably secured to one another by means of releasable fasteners such as screws, push pin mechanisms and the like. In such an alternative embodiment, shells 1912 and 1914 could be selectively separated from one another to allow replacement of ferrule 1916 and brush bristles 1916 attached thereto. In
such an alternative embodiment, ferrule 1914 and brush bristles 1916 would constitute a bristle cartridge. When a particular bristle cartridge were out, brush 1910 could be provided with a replacement bristle cartridge. Moreover, brush 1910 could be selectively provided with a bristle cartridge having brush bristles 1916 with optimal characteristics for a particular painting application.

[0161] FIGS. 32 and 33 illustrate an alternative internal configuration for each of brushes 610-2410 in which the bristles or filaments have ends which are fused directly to the internal surfaces of the handle itself, rather than employing an intermediate internal ferrule. FIGS. 32 and 33 illustrates a paint brush 2010 having such an alternative configuration. FIG. 32 is a fragmentary sectional view of paint brush 2010 while FIG. 33 is a cross-sectional view of paint brush 2010 taken along line 2-2 of FIG. 32. Paint brush 2010 includes the handle 2012 and brush filaments 2014. Handle 2012 includes a gripping portion or neck 2016 which extends to a head 2018. Head 2018 provides a substrate surface 2020 to which filaments 2014 are fused. Head 2018 further includes an integrally formed outer wall 2022 extending from substrate surface 2020 about ends of filament 2014. Surface 2020 preferably includes plateaus 2024 and 2026. Plateau 2024 surrounds plateau 2026 and is itself surrounded by wall 2022. Plateau 2026 extends upward from plateau 2024. Plateau is 2024 and 2026 support filaments 2014 at different heights, enabling filaments having different lengths to be fused to head 2018.

[0162] Brush 2010 provides several advantages over conventionally known paint brushes. First, because filaments 2014 are fused to surface 2020 of head 2018, brush 2010 eliminates the need for glue and the glue's associated dry or cure time. Second, because filaments 2014 are fused to surface 2020, brush 2010 includes different kinds of filaments which are precisely positioned along surface 2020, rather than the random distribution of filaments in conventional brushes. Third, because surface 2020 includes multiple levels of plateaus 2024 and 2026, filaments 2014 having different lengths may be used for different stiffness characteristics. Fourth, because head 2018 of brush 2010 includes an integrally formed outer wall 2022 and plateaus 2024 and 2026, brush 2010 maintains filaments 2014 in a cluster without the need for a ferrule. As a result, brush 2010 is less expensive and complex.

[0163] Although the present invention has been described with reference to preferred embodiments, workers skilled in the art will recognize that changes may be made in form and detail without departing from the spirit and scope of the invention. For example, although different embodiments may have been described as including one or more features providing one or more benefits, it is contemplated that the described features may be interchanged with one another or alternatively be combined with one another in the described preferred embodiments or in other alternative embodiments. Because the technology of the present invention is relatively complex, not all changes in the technology are foreseeable. The present invention described with reference to the various embodiments and set forth in the following claims is manifestly intended to be as broad as possible. For example, unless specifically otherwise noted, the claims reciting a single particular element also encompass a plurality of such particular elements.

What is claimed is:
1. A paint applicator comprising:
   - a handle coupled to the paint applying medium, the handle being adapted to promote a relaxed hand posture when being gripped.
2. The paint applicator of claim 1, wherein the paint applying medium includes a plurality of bristles.
3. The paint applicator of claim 1, wherein the handle includes a shaft portion.
4. The paint applicator of claim 1 including a ferrule coupled to the paint applying medium and the handle.
5. The paint applicator of claim 1, wherein the handle is configured to substantially nest within a user's hand while the hand is in a relaxed hand posture.
6. The paint applicator of claim 1, wherein the handle includes at least one grip locator cue that indicates a gripping location on the handle for achieving a relaxed hand posture.
7. The paint applicator of claim 6, wherein the at least one grip locator cue comprises at least one texturally distinctive surface.
8. The paint applicator of claim 6, wherein the at least one grip locator cue comprises at least one visually distinctive surface.
9. The paint applicator of claim 6, wherein the at least one grip locator cue includes at least one distinctively shaped surface.
10. The paint applicator of claim 1, wherein the handle is both shaped and dimensioned based upon anatomical dimensions of a human hand when the human hand is in a relaxed hand posture.

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